

## WHAT IS CLAIMED IS:

1. An optical system for a projection display, comprising:

a light source for producing light;

5 a light path switching device having a plurality of modes of operation for receiving and reflecting the light, the plurality of modes comprising at least a first mode for directing the light towards a projection lens of the projection display and a second mode for directing the light away from the projection lens; and

10 a total internal reflection (TIR) prism set disposed between the light path switching device and the projection lens and comprising a first prism, a second prism and a third prism, a first gap being formed between the first prism and the second prism and a second gap being formed between the first prism and the third prism;

15 wherein the light enters the light path switching device by means of total internal reflection; and, under the first mode, the light reflected by the light path switching device passes through the first and the second gaps and enters the projection lens, whereas under the second mode, the light reflected by the light path switching device is totally reflected at the boundary between the first gap and the second prism and away from the projection lens.

20 2. The optical system according to claim 1, wherein the light that is totally reflected at the boundary between the first gap and the second prism under the second mode is further reflected on the surface of the second prism closest to the light path switching device under the second mode.

25 3. The optical system according to claim 2, wherein the light leaves the optical system via a side surface of the second prism under the second mode, and a light-absorbing substance is applied on the side surface.

4. The optical system according to claim 3, wherein the light-absorbing substance is a light-absorbing layer coated on the side surface.

5 5. The optical system according to claim 1, wherein the light path switching device is a micromirror array that consists of a plurality of micromirrors each receiving and reflecting the light.

6. The optical system according to claim 1, further comprising a light guide disposed between the light source and the TIR prism set.

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7. The optical system according to claim 6, further comprising a relay lens disposed between the light guide and the TIR prism set.

15 8. The optical system according to claim 1, wherein the light enters the optical system via the first prism; and the light leaves the optical system via the third prism under the first mode whereas it leaves the optical system via the second prism under the second mode.

20 9. A projection method for an optical system for a projection display comprising the steps of:

guiding the light emitted from a light source onto a light path switching device having a first mode and a second mode of operation;

25 disposing a TIR prism set between the light path switching device and a projection lens of the projection display, the TIR prism set comprising a plurality of prisms and a gap between each two adjacent prisms, TIR prism set which are arranged such that the light emitted from the light source is totally reflected to the light

path switching device at the boundary between the gap and the prism that the light first meets when entering the optical system; and

switching the light path switching device to direct the light reflected by the light path switching device onto a projection lens under the first mode and to direct it away  
5 from the projection lens under the second mode, a total internal reflection occurring at the boundary between the gap and the prism that the light reflected by the light path switching device first meets when entering the TIR prism set under the second mode.

10. The projection method according to claim 9, wherein the light reflected by the  
10 light path switching device is further totally reflected on the surface of the prism closest to the light path switching device under the second mode.

11. The projection method according to claim 9, wherein under the second mode the light leaves the optical system via a side surface of the prism that the light reflected  
15 by the light path switching device first meets, and a light-absorbing substance is applied on the side surface.

12. The projection method according to claim 9 wherein the light path switching device is a micromirror array that consists of a plurality of micromirrors each receiving  
20 and reflecting the light.